# The Affection of RMB Exchange Rate Fluctuation on National Economic Security

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Abstract: This paper employs Vector Auto Regressive method and Principal Components Analysis method to measure the affection of RMB exchange rate fluctuation on national economic security. To estimate national economic security precisely and scientifically, we design an indicator system with 33 indicators from 4 main level of national economic security. The result shows that the RMB exchange rate fluctuation transfer effect on financial security and industry market security is remarkable. At the same time, the fluctuation rate can also have direct and indirect influences on macroeconomic security and human resource security of different aspects.

#### 1. Introduction

National economic security is a stable, balanced and sustainable state that the state economy can get rid of threats and destructions of various domestic and foreign factors. It is a crucial component of economic security under the overall national security concept, a core support for military security, and a solid foundation for political security. Moreover, the national economic security of a country is not only related to the display of national defense and diplomatic strength, but also to the formation of military combat effectiveness, and to the unification of economic development and national security. At the recent stage, China is in the midst of an important strategic opportunity for development, national economic security has become a heat issue. However, in the context of the increasing nationalization of the RMB, it is of great significance to study the affection of RMB exchange rate fluctuations on national economic security.

Therefore, this paper attempts to explore the RMB exchange rate pass-through effects on national economic security since 1978 based on the subsequent theoretical researches. Principal Component Analysis and the Vector Auto Regression model will be used in the study to straighten out the effect of RMB exchange rate on national economic security basis and empirical support for the Bureau of China to make a reasonable conclusion and the differentiated security policy. The paper is organized as follows: Section 2 reviews the theory for models of exchange rate fluctuation that is relevant for our experiments. Section 3 describes the experimental design and implementation of our experimental sessions, while in Section 4 we report the results of the experimental sessions and discuss them in

light of the theory. Section 5 concludes.

#### 2. Theoretical Consideration

National Economic Security. Many scholars believe that security has binary nature. The objective refers to the state of the outside world, while the subjective aspect refers to people's psychological state. Arnold Wolfers distinguishes the duality of security, " In terms of objective meaning, security refers to the fact that the value possessed does not have a real threat. From a subjective point of view, it refers to the fear that value is not attacked." This statement is summarized as a widely accepted concept of security. With the deepening of economic globalization, the interdependence between countries has increased and the economic profits have become more relative, therefore, the economic contradictions have become increasingly prominent. The market economy has expanded on a global scale, making the economies of various countries face more risks, so the global economic fluctuations and economic crises are spreading more rapidly and affecting more widely.

National economic security is a crucial component of national security, meaning differently in different eras and countries. Generally, the study on national economic security mainly takes the Cold War as an important dividing point, forming the following three development stages: (1) Before the Cold War, the state's attention to security is mostly focused on political and military aspects, and customarily defines national security as sovereign security and military security; (2) After the Cold War, the difficulty of using limited military operations to resolve conflicts has increased significantly. Therefore, economic instruments are favored by politicians in developed countries. Along with the deepening development of the world economy, economic competition among developed countries is intensifying, and the world's overall pattern will be determined by the pattern of the world economy ultimately. From this point of view, the focus of national security has shifted from military security in the traditional sense to economy security. (3) Under the trend of economic globalization, the conflicts of profits between countries tend to be solved by complicated means of politics, military, and economy. The new national comprehensive security concept includes an overall security strategy of politics, military, economics and culture and etc. Important areas that affect national economic security include strategic resource security, main market industry security, financial security, information security, population, and employment security, international economic relations and so

**RMB Exchange Rate Fluctuation.** An exchange rate is defined as the amount of one currency that can be exchange for a unit of another currency. And exchange rate fluctuation is the value change of the price of one currency in terms of another currency, including appreciation and depreciation. In fact, there are many factors that cause exchange rate fluctuations, our paper does not conduct further research on this. We mainly concern on the effect that caused by exchange rate fluctuation on national economic security.

In fact, the three Currency Crisis theories have already analyzed the principle that exchange rate fluctuations impact on economic stability. The first-generation Currency Crisis Theory (*Krugman 1996*) conducts that the continued credit expansion policy has led to the deterioration of economic fundamentals, resulting in the inability of a country's fixed exchange rate to be maintained, triggering international short-term capital attacks and a currency crisis finally. The second-generation Currency Crisis Model (*Obstfeld 1996*) focuses on the nature of the crisis and public expectations, there will also come a financial crisis if the public losing confidence in the maintenance of the exchange rate system by government. The third-generation of Currency Crisis theory analyzes the causes of the financial crisis in Southeast Asia. It points out that information asymmetry, fragile financial systems, family businesses and kinship politics may lead to currency crises and even economic crises. All these currency crisis theories summaries the internal connection between exchange rate fluctuation and national economic stability from diverse aspects. Due to the complexity of the intrinsic mechanism,

we need to further study the impact mechanism of exchange rate fluctuations on national economic security through models results.

## 3. Experimental Design and Data Collection

**Data Collection and Indicator Selection.** All data in the paper is based on data published by the National Bureau of Statistics and some financial institutions. The data on the exchange rate of RMB against the US dollar comes from the public data of the Bank for International Settlements. The research field of national economic security contains excessive aspects, our paper simply defines national economic security from four main angels: macroeconomic security ( $I_1$ ), financial security ( $I_2$ ), industry and market security ( $I_3$ ) and human resource security ( $I_4$ ). Due to this definition frame, we design an indicator system to measure the variable national economic security. The indicator system is divided into four levels which correspond to our definition relatively, building the system of 34 indicators as the following table:

	$X_1$	real GDP growth rate	X <sub>4</sub>	M2/GDP
$I_1$	$X_2$	unemployment rate	$X_5$	fiscal deficit/GDP
	$X_3$	inflation rate	$X_6$	Growth rate of fixed asset investment
	$X_1$	short term external debt/ foreign exchange reserve	$X_8$	price earnings ratio of SSE
	$X_2$	external debt service ratio	$X_9$	price earnings ratio of SZSE
	$X_3$	short term external debt/external debt	$X_{10}$	securitization rate
$I_2$	$X_4$	external debt ratio	$X_{11}$	comprehensive compensation rate
	$X_5$	debt ratio	$X_{12}$	insurance penetration
	$X_6$	stock price index volatility of SSE	$X_{13}$	insurance density
	$X_7$	stock price index volatility of SZSE		
	$X_1$	agricultural products purchase price index	$X_7$	high-tech products exports
	$X_2$	Agricultural product production price index	$X_8$	high-tech products imports
I <sub>3</sub>	$X_3$	agricultural futures index	$X_9$	Import commodity price index
13	$X_4$	PPI	$X_{10}$	export commodity price index
	$X_5$	IPI	$X_{11}$	number of foreign-invested enterprises/ total enterprises
	$X_6$	CPI		
<b>I</b> 4	$X_1$	higher education population growth rate	$X_3$	growth rate of number of people going abroad
14	$X_2$	returned students/graduate graduates	$X_4$	employment in foreign enterprises / total employment

Table 3.1 national economic security indicator system

The data window for each indicator level is shown in the following table:

Table 3.2 Data Window

Indicator Lever	Data Window
Macroeconomic Security	Annual data from 1990 to 2017
Financial Security	Annual data from 1993 to 2017
Industry and Market Security	Annual data from 1990 to 2017
Human Resource Security	Annual data from 1978 to 2017

To describe of real exchange rate fluctuations precisely, we use the monthly data of the RMB exchange rate against the US dollar to calculate the annual standard deviation, which is used to characterize the exchange rate fluctuations of the year. The calculation formula is as following:

$$V_t = \sigma_t = \sqrt{\frac{1}{12 - 1} \sum_{i=1}^{12} (x_{ti} - \bar{x_t})^2}$$

where,  $x_{ti}$  represents RMB exchange rate on month i, year t;  $\overline{x_t}$  is the average exchange rate

of year t.

The VAR Model (Vector Auto Regressive Model) is a commonly used econometric model, which first presented by Christopher Sims in 1980. It has been widely used for analysis of time series data. A VAR of a p-dimensional column variable  $\{Y_t\}, t \in \{1,2,\cdots\}$  takes the form

$$Y_t = C + \theta_1 Y_{t-1} + \dots + \theta_p Y_{t-p} + \varepsilon_t$$

where  $\{\varepsilon_t\}$  are independent and identically distributed  $N_p(0,\Sigma)$  errors.

Generally, the first-order VAR model can be expressed as follows

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \alpha_2 x_{t-1} + \varepsilon_{1t}$$
  

$$x_t = \beta_0 + \beta_1 y_{t-1} + \beta_2 x_{t-1} + \varepsilon_{2t}$$

Our paper establishes a VAR model for each level of data to analyze the impact of RMB exchange rate fluctuations on economic security.

## 4. Experimental Results

## 4.1. Macroeconomic Security Level

After the correlation analysis, unit root test, cointegration test, and granger causality test, we conduct a 3rd-order VAR model for 6 variables at the macroeconomic level as following:

$$\begin{aligned} \mathbf{Y}_{t} &= \mathbf{BX} \\ \mathbf{W} \text{here} \quad \mathbf{Y}_{t} &= \left( GDPGrow_{t}, Unemp_{t}, Infla_{t}, M_{t}, Fina_{t}, Fix_{t} \right)' \\ B &= \left( \mathbf{B}_{1}, \mathbf{B}_{2}, \cdots, \mathbf{B}_{6} \right)', X = \begin{pmatrix} \mathbf{X}_{t-1} \\ \mathbf{X}_{t-2} \\ \mathbf{X}_{t-3} \end{pmatrix} \\ \mathbf{B}_{1} &= \left( \boldsymbol{\beta}_{11}, \boldsymbol{\beta}_{12}, \cdots, \boldsymbol{\beta}_{1,21} \right)', \quad \mathbf{B}_{2} &= \left( \boldsymbol{\beta}_{21}, \boldsymbol{\beta}_{22}, \cdots, \boldsymbol{\beta}_{2,21} \right)', \quad \cdots, \mathbf{B}_{6} &= \left( \boldsymbol{\beta}_{61}, \boldsymbol{\beta}_{62}, \cdots, \boldsymbol{\beta}_{6,21} \right)', \\ \mathbf{X}_{t-1} &= \left( V_{t-1}, GDPGrow_{t-1}, Unemp_{t-1}, Infla_{t-1}, M_{t-1}, Fina_{t-1}, Fix_{t-1} \right)', \\ \mathbf{X}_{t-2} &= \left( V_{t-2}, GDPGrow_{t-2}, Unemp_{t-2}, Infla_{t-2}, M_{t-2}, Fina_{t-2}, Fix_{t-2} \right)', \\ \mathbf{X}_{t-3} &= \left( V_{t-3}, GDPGrow_{t-3}, Unemp_{t-3}, Infla_{t-3}, M_{t-3}, Fina_{t-3}, Fix_{t-3} \right)' \end{aligned}$$
 The coefficient estimator  $\boldsymbol{\beta}_{ij}$  is shown in the following table:

- **-**

i	1	2	3	4	5	6
j						
1	<mark>-0.21</mark>	<mark>-0.001</mark>	1.67	<mark>1.71</mark>	<mark>0.79</mark>	<mark>-0.89</mark>
2	0.95	-0.02	-3.04	-11.35	4.91	-2.05
3	-7.41	-0.002	8.23	-19.99	-6.19	-36.31
4	-0.08	-0.003	4.44	5.34	1.75	-0.8
5	0.06	-0.005	-2.59	-3.12	-0.94	0.36
6	0.01	0.0005	0.31	0.16	0.11	-0.08
7	0.05	0.007	0.46	-0.09	2.95	-0.84
8	0.02	<mark>0.005</mark>	<del>-4.34</del>	<mark>-6.85</mark>	1.63	-0.28
9	-0.11	0.01	-16.67	-18.02	-9.38	6.55
10	8.16	0.5	-163.43	-227.37	57.41	19.81
11	0.11	-0.005	-6.84	-10.61	2.37	0.34
12	-0.12	0.004	4.04	6.17	-1.37	-0.48
13	0.019	0.0007	-0.43	-0.53	0.01	0.03
14	0.2	-0.002	-6.53	-9.45	-0.77	0.91
15	0.003	0.002	-2.10	-3.25	<mark>0.16</mark>	<mark>-0.09</mark>
16	0.17	0.03	26.40	40.52	1.98	-3.01
17	-2.97	-0.03	68.95	104.61	-32.62	3.07
18	-0.035	0.002	2.06	3.20	-3.56	0.23

Table 4.1 Macroeconomic level VAR model coefficient estimation

19	0.09	0.001	-2.5	-3.84	3.09	-0.21
20	0.01	-0.00001	0.32	0.47	-0.17	-0.09
21	-0.07	-0.007	4.24	5.91	-2.11	-0.18

The results in figure 4.1 are fully explaining the impact on national economic security from the macro level. RMB exchange rate fluctuation has the greatest impact on M2 's (Broad Money) share of GDP. With one unit increase of fluctuation of the RMB exchange rate in the first period, the proportion increase by 1.71 units, and decreases by 6.85 units and 3.25 units in the second and third period relatively. Meanwhile, the RMB exchange rate fluctuation has the least impact on the unemployment rate. When the fluctuation changes by one unit from one to three periods, the unemployment rate keeps almost unchanged. Moreover, The hysteresis effect of RMB exchange rate volatility on GDP growth rate decreases with the increase of lag period.

## 4.2. Financial security Level

There are 13 indicators in this level, and most of them have a strong correlation. Therefore, the data needs to be dimension-reduced before formal modeling. We use PCA (Principal Component Analysis) to reduce dimensionality. The results are as follows:

Table 4.2 PCA contribution rate on financial security level

Component	Eigen Value	Contribute Rate	Accumulative Contribute Rate
1	4.78	0.37	0.37
2	2.73	0.21	0.58
3	2.21	0.17	0.75
4	1.17	0.09	0.84
5	0.76	0.06	0.90
6	0.55	0.04	0.94
7	0.33	0.03	0.96
8	0.20	0.02	0.98
9	0.12	0.01	0.99
10	0.09	0.01	1.00
11	0.03	0.00	1.00
12	0.02	0.00	1.00
13	0.01	0.00	1.00

(The figure of PCA Scree Plot on financial security level can be found in appendix)

Table.4.3 PCA Factor Load Table on financial security level

Original Variable	1st PC	2 <sup>nd</sup> PC	3 <sup>rd</sup> PC	4 <sup>th</sup> PC
short term external debt/ foreign exchange reserve	-0.08	0.16	<mark>-0.76</mark>	-0.47
external debt service ratio	<mark>-0.87</mark>	-0.09	-0.32	0.00
short term external debt/external debt	0.95	0.15	-0.14	0.01
external debt ratio	<mark>-0.78</mark>	-0.06	-0.33	-0.05
debt ratio	<mark>-0.76</mark>	0.02	-0.61	0.05
stock price index volatility of SSE	0.06	<mark>-0.76</mark>	0.13	-0.15
stock price index volatility of SZSE	0.13	<mark>-0.62</mark>	0.27	0.17
price earnings ratio of SSE	-0.42	<mark>-0.76</mark>	0.13	-0.36
price earnings ratio of SZSE	0.22	-0.83	-0.37	-0.12
securitization rate	0.70	-0.57	-0.21	0.10

compensation rate	-0.23	-0.32	-0.37	0.80
insurance penetration	0.85	0.03	-0.39	-0.24
insurance density	0.66	0.09	<mark>-0.67</mark>	0.21

According to the table, the relationship between the original variable and the four principal components is as follows:

$$z_1 = a_1 X$$
,  $z_2 = a_2 X$ ,  $z_3 = a_3 X$ ,  $z_4 = a_4 X$ 

where  $z_i$ , i = 1,2,3,4, refers principal components,  $a_i$ , i = 1,2,3,4, is the factor load of the  $i^{th}$  principal component, X is the original variable. From the value in the table, we get that the 1<sup>st</sup> principal component is the main components of security, insurance and foreign debt. And the higher the degree of securitization and insurance are, the larger the first principal component is, and the greater the risk of external debt, the smaller the first principal component is; The 2<sup>nd</sup> principal component is the main component of stock market with a higher stock market risk the smaller the second component; The 3<sup>rd</sup> principal component is the main component of per capita insurance, the better the per capita insurance situation, the smaller the third principal component; And the 4<sup>th</sup> principal component is the main component of insurance performance, the better the performance, the bigger the fourth principal component.

So far, the variable has been reduced from 13 original variables to 4 main components after the principal component analysis. Then we establish a 3rd-order VAR model between the four principal components and the RMB exchange rate fluctuation, as follows:

$$\begin{aligned} \mathbf{Y}_{t} &= \mathbf{BX} \\ \text{where} \quad \mathbf{Y}_{t} &= (FirstPC_{t}, SecendPC_{t}, ThirdPC_{t}, FouthPC_{t})', \\ B &= (\mathbf{B}_{1}, \mathbf{B}_{2}, \cdots, \mathbf{B}_{4})', X = \begin{pmatrix} \mathbf{X}_{t-1} \\ \mathbf{X}_{t-2} \\ \mathbf{X}_{t-3} \end{pmatrix} \\ \mathbf{B}_{1} &= (\beta_{11}, \beta_{12}, \cdots, \beta_{1,15})', \quad \mathbf{B}_{2} &= (\beta_{21}, \beta_{22}, \cdots, \beta_{2,15})', \quad \cdots, \mathbf{B}_{4} &= (\beta_{41}, \beta_{42}, \cdots, \beta_{4,15})', \\ \mathbf{X}_{t-1} &= (V_{t-1}, FirstPC_{t-1}, SecendPC_{t-1}, ThirdPC_{t-1}, FouthPC_{t-1})', \\ \mathbf{X}_{t-2} &= (V_{t-2}, FirstPC_{t-2}, SecendPC_{t-2}, ThirdPC_{t-2}, FouthPC_{t-2})', \\ \mathbf{X}_{t-3} &= (V_{t-3}, FirstPC_{t-3}, SecendPC_{t-3}, ThirdPC_{t-3}, FouthPC_{t-3})' \end{aligned}$$
 The coefficient estimator  $\beta_{ij}$  is shown in the following table 4.4:

Table 4.4 Financial security level VAR model coefficient estimation

i	1	2	3	4
1	0.32	0.44	-0.82	-1.19
2	-0.06	0.08	-0.21	-0.2
3	-0.06	-0.48	1.11	0.38
4	-0.68	0.67	-0.51	0.22
5	3.87	<del>-</del> 8.64	11.65	<mark>3.71</mark>
6	0.04	0.05	0.005	0.29
7	-0.02	-0.12	0.09	-0.05
8	0.03	0.32	-0.24	-0.21
9	0.18	-1.57	-0.01	-0.36
10	<mark>9.36</mark>	<mark>-14.52</mark>	<mark>-14.12</mark>	<mark>-2.6</mark>
11	0.42	-0.23	0.63	-0.85
12	-0.09	-0.27	-0.21	0.24
13	0.11	-0.60	-0.08	-0.22

14	-0.07	0.51	-0.50	0.16
15	<mark>-5.52</mark>	22.88	<mark>6.92</mark>	<mark>10.74</mark>

The results in table 4.4 describe the impact on national economic security from the financial level. We get our second observation: The fluctuation of the RMB exchange rate has the greatest impact on per capita insurance and stock market risks in the first period. With one unit increase of fluctuation of the RMB exchange rate, the insurance situation per capita has improved by 11.65 units, and the stock market risk has increased by 8.64 units; While the fluctuation has the greatest affection on the degree of securitization and insurance, external debt risk and stock market risk in the second period. The volatility rate increases by one unit, the degree of securitization and insurance increase by 9.36 units, the risk of external debt decreases by 9.36 units, and the risk of the stock market increases by 14.52 units; In the third period, stock market risk and insurance performance are most affected. The RMB exchange rate fluctuations per unit change lead to 22.88-unit-decreasing in stock market risk decreasing and 10.74-unit-increasing in insurance performance.

# 4.3. Industry and Market Security

There are 11 indicators in this level, and most of them have a strong correlation. We also conduct a PCA to reduce dimensionality, then get the coefficient estimator table.

Table 4.5 PCA contribution rate on industry and market security level

Component	Eigen Value	Contribute Rate	Accumulative Contribute Rate
1	5.07	0.46	0.46
2	2.18	0.20	0.66
3	1.24	0.11	0.77
4	1.09	0.10	0.87
5	0.85	0.08	0.95
6	0.22	0.02	0.97
7	0.19	0.02	0.98
8	0.08	0.01	0.99
9	0.06	0.01	1.00
10	0.03	0.00	1.00
11	0.00	0.00	1.00

(The figure of PCA Scree Plot on financial security level can be found in appendix)

Table 4.6 PCA Factor Load Table on industry and market security level

Original Variable	1st PC	2 <sup>nd</sup> PC	3 <sup>rd</sup> PC	4 <sup>th</sup> PC
agricultural products purchase price index	-0.53	-0.02	-0.12	0.76
Agricultural product production price index	<mark>-0.91</mark>	0.28	-0.07	0.15
agricultural futures index	<mark>-0.82</mark>	0.41	-0.18	-0.20
PPI	<mark>-0.89</mark>	-0.10	-0.21	-0.18
IPI	-0.70	-0.28	-0.14	-0.50
СРІ	<mark>-0.88</mark>	0.07	-0.42	-0.01
high-tech products exports	0.38	0.89	-0.07	-0.13
high-tech products imports	0.39	0.89	-0.07	-0.13
Import commodity price index	-0.59	0.12	0.66	-0.13
export commodity price index	-0.68	0.46	0.41	0.28
number of foreign-invested enterprises/ total enterprises	-0.37	-0.13	0.57	-0.17

Then we get the following equation sets:

$$z_1 = a_1 X$$
,  $z_2 = a_2 X$ ,  $z_3 = a_3 X$ ,  $z_4 = a_4 X$ 

where  $z_i$ , i = 1,2,3,4, refers principal components,  $a_i$ , i = 1,2,3,4, is the factor load of the  $i^{th}$  principal component, X is the original variable.

The load table summarizes our new four principal components on industry and market security level: the 1<sup>st</sup> principal component is the main component of product price index, while higher index refers to smaller components; The 2<sup>nd</sup> principal component is mainly about amount of import and export of high-tech products, and larger amount makes larger component; The 3<sup>rd</sup> principal component is the main components of The number of foreign-invested enterprises accounts for the total number of enterprises and the 4<sup>th</sup> is about Agricultural product purchase price index.

After the principal component analysis, we again implement a 3<sup>rd</sup>-order VAR model, as following:

$$\begin{array}{c} \mathbf{Y}_{t} = \mathbf{BX} \\ \text{where } \ \mathbf{Y}_{t} = (FirstPC_{t}, SecendPC_{t}, ThirdPC_{t}, FouthPC_{t})', \\ B = (\mathbf{B}_{1}, \mathbf{B}_{2}, \cdots, \mathbf{B}_{4})', X = \begin{pmatrix} \mathbf{X}_{t-1} \\ \mathbf{X}_{t-2} \\ \mathbf{X}_{t-3} \end{pmatrix} \\ \mathbf{B}_{1} = (\boldsymbol{\beta}_{11}, \boldsymbol{\beta}_{12}, \cdots, \boldsymbol{\beta}_{1,15})', \quad \mathbf{B}_{2} = (\boldsymbol{\beta}_{21}, \boldsymbol{\beta}_{22}, \cdots, \boldsymbol{\beta}_{2,15})', \quad \cdots, \mathbf{B}_{4} = (\boldsymbol{\beta}_{41}, \boldsymbol{\beta}_{42}, \cdots, \boldsymbol{\beta}_{4,15})', \\ \mathbf{X}_{t-1} = (V_{t-1}, FirstPC_{t-1}, SecendPC_{t-1}, ThirdPC_{t-1}, FouthPC_{t-1})', \\ \mathbf{X}_{t-2} = (V_{t-2}, FirstPC_{t-2}, SecendPC_{t-2}, ThirdPC_{t-2}, FouthPC_{t-2})', \\ \mathbf{X}_{t-3} = (V_{t-3}, FirstPC_{t-3}, SecendPC_{t-3}, ThirdPC_{t-3}, FouthPC_{t-3})' \\ \mathbf{And get the coefficient estimation} \ \boldsymbol{\beta}_{ii} : \\ \end{array}$$

Table 4.7 Industry and market level VAR model coefficient estimation

i	1	2	3	4
1	0.90	0.13	0.58	0.53
2	2.12	0.61	-0.46	1.24
3	0.03	-0.2	0.87	0.08
4	1.47	-0.71	-1.07	-0.38
5	<del>-8.65</del>	<mark>0.75</mark>	13.8	1.03
6	-0.37	0.19	0.09	-0.35
7	-1.05	0.007	1.02	-0.39
8	-0.07	0.61	-0.09	-0.45
9	0.85	-0.76	-0.66	-0.02
10	10.82	<mark>-7.31</mark>	<mark>-19.61</mark>	<mark>-7.72</mark>
11	0.17	-0.45	-0.76	-0.24
12	-0.76	-0.23	-0.84	-0.79
13	0.58	-0.42	-0.67	-0.39
14	0.81	-0.46	-0.77	-0.17
15	<mark>-2.44</mark>	<mark>2.62</mark>	<mark>-0.72</mark>	<mark>-0.41</mark>

We therefore have our third key observation: The fluctuation of the RMB exchange rate has the greatest impact on import and export products price index and the ratio of foreign-invested enterprises to total enterprises. In the first period, each unit change of exchange rate fluctuation makes 13.8-unit increase of the 3<sup>rd</sup> principal component, which means higher risks. While it leads to 19.61-unit decrease, which means less risks, in the second period. In the third period; In the third period, the fluctuation has the greatest affection on amount of import and export of high-tech products, RMB exchange rate fluctuations increased by one unit, the amount of imports and exports of high-tech products increased by 2.62 units.

# 4.4. Human Resource Security

After the correlation analysis, unit root test, cointegration test, and granger causality test, we carry out VAR model with three variables:

$$\begin{aligned} \mathbf{Y}_{t} &= \mathbf{B} \mathbf{X}_{t-1} \\ \text{where } \mathbf{Y}_{t} &= (HiEdu_{t}, Back_{t}, Goabr_{t})', \ \ B &= (\mathbf{B}_{1}, \mathbf{B}_{2}, \mathbf{B}_{3})', \mathbf{B}_{1} = (\boldsymbol{\beta}_{11}, \boldsymbol{\beta}_{12}, \cdots, \boldsymbol{\beta}_{1,4})' \\ \mathbf{B}_{2} &= \left(\boldsymbol{\beta}_{21}, \boldsymbol{\beta}_{22}, \cdots, \boldsymbol{\beta}_{2,4}\right)' \\ \mathbf{B}_{3} &= (\boldsymbol{\beta}_{31}, \boldsymbol{\beta}_{32}, \cdots, \boldsymbol{\beta}_{3,4})' \\ \mathbf{X}_{t-1} &= (V_{t-1}, HiEdu_{t-1}, Back_{t-1}, Goabr_{t-1})', \end{aligned}$$

Then we get the coefficient estimator  $\beta_{ij}$ :

Table 4.8 Human resource security level VAR model coefficient estimation

j	1	2	3
1	0.42	0.28	<mark>0.49</mark>
2	0.03	0.11	0.06
3	0.09	0.62	0.05
4	0.29	0.01	0.42

Our last key observation is that the fluctuation of the RMB exchange rate has the greatest impact on growth rate of people going abroad and higher education population. Each unit change of fluctuation makes 0.49-unit population increase going aboard and 0.28-unit getting higher education.

#### **Conclusion**

The national security concept of the Russian Federation stated that the threats in our economy are complex. It is determined by scientific and technical and technological potential weakening, economic disintegration, social differentiation of the society, the devaluation of spiritual values, the criminalization of social relations, rising terrorism and organized crime. However, with our empirical results, it is obvious that the financial security, market, and industry security are affected by RMB exchange rate fluctuation, especially some foreign-related indicators, such as import and export products price index and the ratio of foreign-invested enterprises to total enterprises. These threats are not completely revealed the indicator system, that is why it is difficult to define their concrete boundaries, acuity and work out a unified state approach to protect national economic security. In Further Research, we may concern more how the exchange rate fluctuation act on these foreign-related indicators. And it is necessary to look forward to other variables that play a great role in national security economic.

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